~~CONFIDENTIAL~~

CLASSIFICATION CHANGE

To UNCLASSIFIED

By authority of GSS-E0 11652

Changed by L. Shirley Date 12/31/72

Classified Document Master Control Station, NASA
Scientific and Technical Information Facility

Accession No. 54481-64

Copy No. 67 SID 63-695

PROJECT APOLLO
END ITEM SPECIFICATION
BOILERPLATE NUMBER 26 (U)

5 March 1964 NAS9-150

Paragraph 4.2, Exhibit I.

NORTH AMERICAN AVIATION, INC.
SPACE and INFORMATION SYSTEMS DIVISION

~~Downgraded [illegible]~~

~~CONFIDENTIAL~~

TABLE OF CONTENTS

TABLE OF CONTENTS (CON'T)

TABLE OF CONTENTS (CON'T)

LIST OF ILLUSTRATIONS

APPENDICES

APPENDICES (CON'T)

PROJECT APOLLO
END ITEM SPECIFICATION
BOILERPLATE NUMBER 26

1. SCOPE

1.1 Scope. - This specification defines the requirements for a simulated Apollo spacecraft consisting of a launch escape system (LES), command module (CM), service module (SM), and adapter hereinafter referred to as Boilerplate Number 26.

1.1.1 Specification Organization. - This specification is organized as follows:

Basic section

Appendix A - Drawings

Appendix B - Process Specifications

Appendix C - Material Specifications

Appendix D - Procurement Specifications

Appendix E - Flight Instrumentation

1.1.2 Mission. - Boilerplate Number 26 is the second vehicle for the micro-meteoroid experiment.

1.1.3 Objectives. - Boilerplate Number 26 shall be used for the launch vehicle qualification and micrometeoroid experiment. Test objectives will be determined by MSFC.

2. APPLICABLE DOCUMENTS

2.1 Applicability. - The following documents of the issue in effect on the date of contract form a part of this specification to the extent specified herein.

2.1.1 Government Documents. -

SPECIFICATIONS

Military

MIL-E-5400	Electronic Equipment, Aircraft, General Specification for
MIL-I-8500	Interchangeability and Replaceability of Component Parts for Aircraft and Missiles, Specification for
MIL-L-6880	Lubricating, Aircraft, General Specification for
MIL-R-27542	Reliability Program Requirements for Systems, Subsystems, and Equipment, Specification for

STANDARDS

MIL-STD-130	Identification Marking of U.S. Military Property

2.1.2 Non-Government Documents.

SPECIFICATIONS

North American Aviation, Inc.,
Space and Information Systems Division (NAA/S&ID)

MA 0116-012	Preparation for Delivery and Transport of Apollo Boilerplates, Specification for
MC 999-0002B	Electromagnetic Interference Control for the Apollo Space System, Specification for

OTHER DOCUMENTS

SID 62-109	General Test Plan, Research and Development for Project Apollo Spacecraft, dated March 1963
SID 62-223	Apollo Program Plan
SID 63-143	Actual Weight and Balance Report Boilerplate Number 26
SID 63-313	Apollo Master Spacecraft Specification

DRAWINGS

North American Aviation, Inc.

Space and Information Systems Division (NAA/S&ID)

B14-000024	Finish Specification Apollo Boilerplate, Complete
B14-000002-251	General Assembly, Boilerplate Number 26
B15-000002-221	General Assembly, LES 15
B16-000002-281	General Assembly, CM 26
B17-000002-221	General Assembly, SM 11
B18-000002-251	General Assembly, Adapter 16
B18-320113	Structure, Insert

2.2 Precedence. - The order of precedence in case of conflict will be as follows:

(a) The contract

(b) This specification

(c) Other documents referenced herein

3. REQUIREMENTS

3.1 General. - The following paragraphs delineate the requirements for design, fabrication, assembly, and performance for Boilerplate Number 26. Systems and subsystems development plan philosophy is reflected in SID 62-223, Apollo Program Plan.

3.1.1 Weight. - Weight, center of gravity, and moments of inertia data for Boilerplate Number 26 shall be presented in Specification SID 63-143.

3.1.2 Materials. - Materials shall be compatible with design, weight, and load criteria.

3.1.2.1 Fabrication. - Structural design concepts of Boilerplate Number 26 emphasize employment of proven manufacturing techniques and methods to the greatest possible extent. Maximum use shall be made of developed "off-the-shelf" components fabricated by dependable manufacturers.

3.1.3 Design Criteria. - Design criteria shall be in accordance with rational design principles as specified in Specification SID 63-313.

3.1.3.1 Electromagnetic Interference. - Electromagnetic interference control shall be in accordance with Specification SID MC 999-0002.

3.1.3.2 Environment. - The environmental design criteria for Boilerplate Number 26 shall be as specified in Specification SID 63-313.

3.1.3.3 Checkout Provisions. - Boilerplate Number 26 shall be designed with provisions for system and integrated system checkout and test capabilities.

3.1.4 Interchangeability. - Interchangeability as defined for the Apollo Program shall be in accordance with Specification MIL-I-8500 and shall apply to all completely finished assemblies, components, and parts which shall be capable of being readily installed, removed, or replaced without alternation, misalignment, or damage to parts being installed or to adjoining parts. No fabrication operations, such as cutting, filing, drilling, reaming, hammering, bending, prying, or forcing, shall be required for installation.

3.1.4.1 Interchangeability of Electronic Equipment. - Interchangeability of electronic equipment shall be in accordance with Specification MIL-E-5400, where applicable. Interchangeability of electronic equipment for the Apollo Program shall require that mechanical and electrical interchangeability shall exist between like assemblies, subassemblies, and replaceable parts be easily effected without physical or electrical modification to any part of the equipment, including; cabling, wiring, and mounting and without resorting to selection; however, adjustment, trimming, or calibration may be made.

3.1.5 Replaceability. - Replaceability, as defined for the Apollo Program, shall be in accordance with Specification MIL-I-8500 and shall apply to parts which may require additional work or operations during installation. This may include such additional operations as drilling, reaming, cutting, filing, trimming, shimming, or other means, normally associated with installing the original assembly into the end item. Replaceable parts shall be designed to permit replacement under field maintenance conditions.

3.1.6 Finish. - Finish requirements shall be as specified in SID Drawing B14-000024.

3.1.7 Identification and Marking. - Identification and marking shall be in accordance with Specification MIL-STD-130.

3.1.8 Identification and Traceability. - Identification and traceability shall be in accordance with the requirements of Specification SID MA 0201-0208.

3.1.9 Lubrication. - Lubrication of components, where required, shall be in accordance with the requirements of Specification MIL-L-6880. No petroleum-base lubricants shall be used. Lubricants shall be of the silicone base, fluorolube, oxylube 702, and dry film type. Lubrication shall not cause any toxic or flammable substances to occur in the CM or in the environmental control system.

3.1.10 Reliability. - An integrated reliability program, generally in accordance with Specification MIL-R-27542, shall be conducted throughout the design, development, and fabrication, and checkout and acceptance of Boilerplate Number 26.

[redacted]

3.2 Configuration. - The configuration of Boilerplate Number 26 is shown in Figure 1. For detailed configuration information, refer to SID Drawing B14-000002-251.

3.2.1 Launch Escape System. - The LES shall consist of the following major components:

(a) Nose cone

(b) Pitch control motor cover

(c) Tower jettison motor

(d) Launch escape motor (empty case)

(e) Structural skirt

(f) LES tower

(g) LES tower separation sequencer

3.2.1.1 Nose Cone. - The LES nose cone shall provide capabilities for mounting, in the nose cone apex, a NASA furnished Q-Ball assembly and wiring from the Q-Ball interface to the booster interface. Provisions for accomodating 1,500 pounds of lead ballast within the ballast enclosure shall also be made.

3.2.1.2 Pitch Control Motor Cover. - A cover shall be provided to close the pitch control motor nozzle opening.

3.2.1.3 Tower Jettison Motor. - The tower jettison motor shall be a solid propellant motor 55.6 inches in length and 26 inches in diameter. The motor shall have two fixed thrust nozzles canted 30 degrees from the mean motor centerline. The resultant thrust axis shall be located 2.5 degrees plus or minus 30 minutes from the mean motor centerline of the pitch plane. The jettison motor shall weigh approximately 534 pounds, which includes the interstage structure, shall develop 33,000 pounds of thrust and shall fire for 1.2 seconds. The rocket motor shall be ignited by a pyrogen type igniter which shall utilize two hotwire initiators.

3.2.1.4 Launch Escape Motor. - The launch escape motor shall be an inert empty launch escape motor case with nozzles removed. It shall be 183 inches in length and 26 inches in diameter and shall provide interstage structure between the LES jettison motor and structural skirt.

3.2.1.5 Structural Skirt. - A structural skirt assembly shall be utilized to mount the launch escape motor to the tower. The skirt shall be constructed of a forged ring with longerons, welded to a shear skin, that shall transfer uniform load from the launch escape motor to four points at the launch escape tower legs. The structural skirt shall be bolted to the LES tower.

3.2.1.6 Launch Escape Tower. - The launch escape tower shall be a four-legged welded tubular alloy, truncated rectangular cross-sectioned pyramid, 120 inches in length with a base 46 inches by 50 inches. The tower shall form the intermediate structure between the CM and the launch escape motor. At the bottom of the tower, quick-release mechanisms shall be incorporated to attach the tower to the CM inner structure. The tower structure shall be covered with ablative material, Buna-N rubber sixty per cent silica filled.

3.2.1.7 LES Tower Separation Sequencer. - The two LES tower separation sequencers shall control, upon receipt of tower separation signal, (1) launch escape tower separation and (2) ignition of the LES jettison motor. The separation signals shall be transmitted through redundant busses, A and B.

3.2.1.8 Electrical System. - The LES electrical system shall consist of the following major components:

(a) Mission sequencer (located in CM)

(b) Wiring harnesses and associated attachments

(c) Hotwire initiators

(d) Hotwire firing units

(e) Associated pyrotechnic batteries, wiring, and attachments.

3.2.1.8.1 Mission Sequencer. - The mission sequencer shall automatically control LES tower separation sequencer and CM-SM separation. Other functions of the mission sequencer are undetermined at this date.

3.2.1.8.2 LES Electrical Wiring Harness. - Redundant wiring harnesses shall be bonded to the exterior of the launch escape motor and associated redundant harnesses shall be integral to the tower structure. The wiring harnesses shall provide the means of connecting the rocket motor and separation circuits with the sequence controllers and the instrumentation components with the communications equipment. Each tower structure harness shall have a breakaway type plug that shall permit the harness to be detached, at the separation plane, when the launch escape tower is jettisoned.

3.2.1.8.3 Hotwire Initiators. - The hotwire initiators contain two electrical high resistant wires threaded into pyrotechnic cartridges which fire the igniter of the rocket motor. The initiators shall be redundant for increased reliability.

3.2.1.8.4 Hotwire Firing Units. - The hotwire firing units shall be pyrotechnic cartridges which shall be detonated by current passing through the high resistant electrical hotwire initiators. The pyrotechnic cartridges shall then fire the rocket motor igniters.

3.2.1.8.5 Pyrotechnic Batteries. - The pyrotechnic batteries for the LES shall be housed in the CM. Electrical wiring shall provide the means by which current will be carried from the batteries to the pyrotechnic firing units.

3.2.1.9 Umbilical System. - The umbilical system shall contain electrical wiring between the CM and LES. The umbilical shall be detached by strain on the lanyard type disconnect when the LES jettison motor causes CM-LES separation.

3.2.1.10 Pyrotechnic System. - The pyrotechnic system shall consist of the following:

(a) Pyrotechnic batteries

(b) Hotwire initiators

(c) Disconnect assemblies.

3.2.1.11 LES Tower Separation System. - The LES tower separation system shall consist of explosive bolts, used for LES tower- CM attachment, and flexible linear shaped explosive charges placed beneath the four attachment explosive boltheads that secure the tower to the CM.

Redundant hotwire initiators shall be used to detonate the explosive bolts and flexible linear shaped explosive charges. The hotwire initiators shall be actuated by 28 volt dc signals which shall be received from the redundant LES tower separation sequencer. To accomplish LES tower jettison, the tower separation sequencer will simultaneously apply detonation signals to the explosive bolt initiators and the tower jettison motor firing units. The LES assembly will be released and propelled clear of the boilerplate trajectory.

3.2.2 Command Module. - The CM shall consist of the following:

(a) CM structure

(b) Mission sequencer

(c) Electrical power system

(d) The R and D communications equipment

(e) The R and D instrumentation equipment

(f) Environmental Control System (ECS).

3.2.2.1 Command Module Structure. - The CM shall be of conical design, 141 inches high and 154 inches in diameter at the base with a net weight of approximately 9000 pounds. The structure shall be fabricated from aluminum with a skin thickness of approximately 0.190 inch. Attach fittings shall be provided at the forward bulkhead to engage the launch escape tower legs. The configuration of the CM shall be in accordance with SID Drawing B16-000002-281 and shall be similar to the ultimate spacecraft CM. All equipment in the CM shall be placed as near as possible to the position to be occupied in the ultimate spacecraft CM. The CM structure shall include the following:

(a) Cabin housing

(b) Heat shield structure

(c) Separation system

3.2.2.1.1 Cabin Housing. - The CM shell shall be constructed of aluminum alloy welded into two subassemblies, (1) the forward crew compartment and (2) the aft crew compartment. The subassemblies shall be bolted together and the aft skirt frames and skin shall be attached by mechanical fasteners.

3.2.2.1.2 Forward Bulkhead and Egress Tube. - The forward bulkhead structure shall consist of a double skin with riveted stiffeners. The closeout skin shall be attached to stiffeners by blind fasteners. The egress tube shall consist of a welded sheet tube of aluminum welded to the forward bulkhead. A cover plate shall be bolted to the top of the egress tube.

3.2.2.1.3 Forward Crew Compartment. - The forward crew compartment shall consist of multi-stiffeners welded to the outer skin. The stiffeners shall consist of four main longerons attached to the launch escape tower fittings in the forward bulkhead and terminate in the mid-ring splice joint at the aft end of the forward section of the crew compartment. Several secondary longerons shall be utilized for load transfer from the forward bulkhead to the mid-ring. The remaining stiffeners shall assist the skin in resisting airloads.

3.2.2.1.4 Aft Crew Compartment. - The aft section of the crew compartment shall consist of a sidewall with stiffeners, corresponding to those of the forward section of the crew compartment, from the mating aft section of the crew compartment mid-ring to the machined ring forging at the junction of the sidewall and the floor.

3.2.2.1.4.1 Aft Heat Shield. - A 15 inch diameter hole, with reinforcement as necessary, shall be added to the aft heat shield to provide access to the micro-meteoroid pyrotechnic tie point. A 15 inch hole shall also be added to the aft bulkhead. A doubler, door, and seal shall be included.

3.2.2.1.5 Apex Forward Compartment Heat Shield Cover. - The apex forward compartment heat shield cover structure shall form the forward section of the CM structure and shall consist of an aluminum alloy skin and stiffeners utilizing riveted and bolted construction. A lightweight inner skin shall be used to insure a smooth surface. The nose cone will be aluminum.

3.2.2.1.5.1 CM Insulation. - The CM exterior shall be provided with suitable cork insulation to protect the module from aerodynamic heating during the launch phase.

3.2.2.1.6 Access Hatch. - The main hatch shall provide access to the CM interior. The hatch shall be constructed of reinforced aluminum plate and shall be bolted into place. It shall be located in the CM sidewall over the head of the center couch position.

3.2.2.1.6.1 Access Doors. - Access doors shall be provided in the skirt structure for servicing the heat shield attach struts. Four openings shall be provided in the forward crew compartment structure, 90 degrees apart, for telemetry antennas.

3.2.2.1.7 Scimitar Antenna. - Two simulated scimitar antennas shall be located on the lower skirt of the CM at station X_c 24.12. One antenna shall be circumferentially centered 22.32 inches from the -Z axis toward the -Y axis. The other shall be centered 3.91 inches from the + Z axis toward the + Y axis. The antenna shall simulate the size, weight, shape and aerodynamic characteristics of the ultimate spacecraft scimitar antennas.

3.2.2.1.8 Dummy CM Vent. - A dummy CM aft equipment compartment vent shall be installed on the CM. It shall be constructed of sheet metal and glass laminate with an attaching holddown secured to the SM.

3.2.2.1.9 Mission Sequencer. - The mission sequencer shall automatically control LES-CM and CM-SM separation. Other possible functions of the mission sequencer will be at the discretion of the MSFC.

3.2.2.1.10 Electrical Power System (EPS). - The CM EPS shall supply and distribute electrical power and shall consist of the following major components:

(a) Main power batteries

(b) Pyro-batteries

(c) Electrical distribution system

(1) CM-LES umbilical

(2) CM-SM umbilical.

3.2.2.1.11 R and D Communications Equipment. - NAA/S&ID has no requirement for R and D communications equipment in Boilerplate Number 26.

3.2.2.1.12 R and D Instrumentation Equipment. - NAA/S&ID has no requirement for R and D instrumentation equipment in Boilerplate Number 26.

3.2.2.1.13 Environmental Control System. - NAA/S&ID has no requirement for an ECS in Boilerplate Number 26.

3.2.2.1.14 CM-SM Attach System. - The CM-SM attach system shall utilize positive tension ties through the three SM compression pads. The three preloaded tension straps shall be secured to the CM inner structure and the SM at the upper beam.

3.2.2.1.15 CM-SM Separation. - Capability for CM-SM separation is not provided for Boilerplate Number 26.

3.2.3 Service Module. - The SM shall be a cylinder 124 inches in length and 154 inches in diameter. The structure shall be aluminum semi-monocoque construction consisting of skin, longerons, and frames.

3.2.3.1 SM Reaction Control System (RCS). - The SM RCS engines shall be installed at station 325. The RCS quad packages shall be dummy motors simulating the size, weight, shape, location, and aerodynamic characteristics of the ultimate spacecraft RCS.

3.2.3.2 CM-SM Fairing. - The boilerplate shall include a fairing between the CM and SM. This fairing shall provide closure of the gap which will be left, by the curvature of the CM aft heat shield, when the CM is mated to the SM and is resting on the compression pads. An inert separation mechanism and a fixed CM-SM umbilical shall be housed within the fairing. The fairing shall be removable and shall be surfaced with cork ablative material.

3.2.3.3 SM Insert. - The SM insert shall be located between the adapter and SM. The insert shall be an aluminum cylinder of semi-monocoque construction 52 inches in length and 154 inches diameter.

3.2.3.4 Adapter. - The adapter shall be an aluminum cylinder of semi-monocoque construction 92 inches in length and 154 inches diameter. It shall be located between the SM insert and the S-IV stage of the S-I Launch Vehicle.

3.2.3.5 SM Purging. - Provisions shall be made in the SM to attach GSE GN_2 purging lines.

3.2.3.6 SM Protective Bulkhead. - A protective bulkhead shall be attached to the lower ring in the SM adapter. This bulkhead shall be an air conditioning barrier to isolate the S-IV cooling system from the adapter cavity.

3.2.4 Launch Vehicle. - The launch vehicle for Boilerplate Number 26 will be Saturn I Block II configuration.

3.3 Performance. - The performance of Boilerplate Number 26 will be outlined by the MSFC.

3.3.1 Trajectectory Parameters. - To be determined by the MSFC.

3.3.2 Flight Plan. - To be determined by the MSFC.

4. QUALITY ASSURANCE

4.1 General Quality Assurance Provisions. - The principal contractor (S&ID) shall be responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the principal contractor may utilize his own or any other inspection facilities and services acceptable to the NASA. Inspection records of the examinations and tests shall be kept complete and available to the NASA as specified in the contract.

4.2 Principal Contractor's Quality Assurance Program. - The principal contractor shall establish a quality assurance program in accordance with the requirements of paragraph 2.5 of Exhibit A of the contract. Inspections and tests to determine conformance of Boilerplate Number 26 to contract and specification requirements shall be conducted prior to submission of the article to the NASA for acceptance.

4.2.1 Reliability Data. - The principal contractor shall act as a test historian and accumulate applicable data on spacecraft tests, plans, and performance from preparation to delivery. The data shall be used in qualitative and quantitive assessments of reliability and performance of each system, and of the ultimate spacecraft. This data, together with other appropriate data, such as acceptance data, shall be integrated with that accumulated from prior tests to form assessments. Thus, a probability of success may be provided for any given phase of the mission.

4.3 Examination. - Each assembly and all major components submitted for acceptance shall be subjected to a visual examination to determine conformance to materials, design, construction, dimensions, color and finish, product marking, and workmanship.

4.3.1 Components. - The principal contractor shall ascertain that, prior to assembly, all parts, components, assemblies, and systems procured under separate specifications or drawings have been inspected, tested, and accepted in accordance with their respective specifications or drawings.

4.4 Tests. - Each assembly, major component, and system submitted for acceptance shall be subject to performance tests as specified in applicable documents including Specification SID 62-109.

5. PREPARATION FOR DELIVERY

5.1 Preservation, Packaging, and Packing. - Preservation, packaging, and packing shall be in accordance with the principal contractor's procedures specified in SID Process Specification MA 0116-012.

6. NOTES

6.1 Delivery of Modules. - The SM, Adapter and Insert will be delivered separately to the MSFC for instrumentation. The LES and CM will be delivered at a later date.

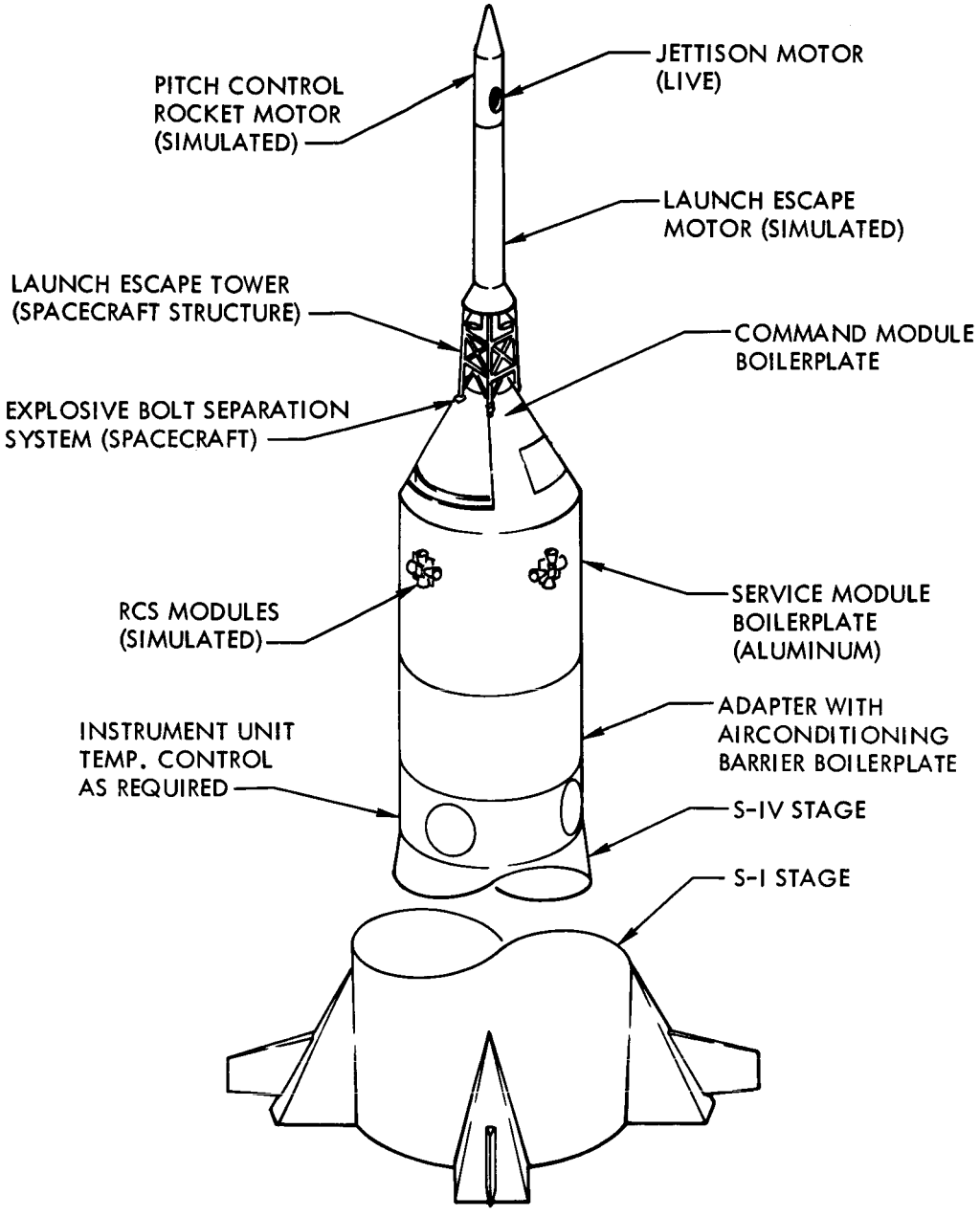

Figure 1. Boilerplate Number 26 Configuration

[redacted]

APPENDIX A
DRAWINGS

1. Scope. - The following list constitutes the top drawings of major components for Boilerplate Number 26.

Nomenclature	Number
General Assembly BP 26	B14-000002-251
General Assembly LES 15	B15-000002-221
Body Group Assembly	V15-300001-71
Tower Assembly	V15-300100-11
Tower Structure	V15-300102-241
Skirt Assembly	V15-300202-41
Power System Installation, Complete	B15-400001-111
Rocket Motor Set	B15-410001-41
Electrical Installation, Complete	B15-450016
Electrical Installation, Tower	B15-451401
Wiring Diagram	B15-450401
Electrical Installation, Motor	B15-451410
General Assembly, CM 26	B16-000002-281
Structure Assembly, Complete CM 26	B16-300016
Structure Assembly	B16-301006-401
Structure, Aft Crew	B16-311006
Aft Bulkhead	B16-301 081
Bulkhead - Forward Assembly	B16-301073-401
Structure - Aft Heat Shield	B16-327006-91
Cover Installation, Ablative	B16-320013
Electrical Installation, Complete	B16-450016
Electrical Installation, Crew Compartment	B16-451401
Wiring Diagram	B16450430
Cover - Sequencer	B16-451207-11
Electrical Installation, Forward Compartment	B16-456401
Electrical Installation, Aft Compartment	B16-457401
General Assembly, SM 11	B17-000002-221
Structure, Complete	B17-300026
Structure, Assembly	B17-320101
Support Assembly	B17-320140-101

APPENDIX A (Continued)

DRAWINGS

Nomenclature	Number
Fairing Installation and Assembly	B17-320142
Fairing Assembly	B17-320141
Electrical Installation, Complete	B17-450016
General Assembly - Adapter 11	B18-000002-221
Structure, Complete	B18-300016
Structure, Insert	B18-320113

APPENDIX B

Process Specifications

1. Scope. - Section I constitutes a list of approved General Process Specifications for the Apollo Program. Those processes required in the fabrication of Boilerplate Number 26 shall be as set forth on the face of the boilerplate drawings. Section II constitutes the list of Specific Process Specifications applicable to Boilerplate Number 26 .

Section I

Number	Nomenclature
AA0101-004	Semi-Conductor, Electrically Insulated, Heat Dissipating, Stud Mounted, Installation Procedure for
AA0106-020	Sealing and Moisture Proofing of Glass and Ceramic Components with Polydimethyle Siloxana Fluids
AA0108-005	Application of Corrosion Barriers Between Dissimilar Metal
AA0109-012	General Procedure for Brush Type Electroplating
AA0110-002	Solvent Vapor Degreasing
AA0116-022	Application of a Strippable Protective Coating to Painted and Plastic Surfaces
FA1-38	Bonding of, Metal Honeycomb Sandwich Parts Using a Vinyl Phenolic Adhesive in Film Form
FA2-101	Sealing Electrical Wire Bundles Passing Through Bulkheads Subject to 400F
FA2-102	Encapsulation of Wire Harness Junction for Ground Handling Equipment

APPENDIX B (Continued)

Number	Nomenclature
FA2-103	Fume Tight Sealing of Electrical Wire Bundles with Normal Operating Temp 275-350F
FA2-16	Faying Surface Sealing for Areas with Normal Operating Temperatures from -65 to 22F
FA2-23	Impregnation of Ceramic and Plastic Parts
FA2-90	Sealing Electric Terminations, Subject to Temperatures Up to 300F
FA6-130	Machining of Aluminum Alloy Casting to Precise Dimensions
FA6-199	Identification of Teflon Insulated Cable
FA6-2	Turnbuckles Quick Disconnect Adjustment Safetying Procedure
FA6-236	Attaching Sockets to Wire Rope
FA6-91	Seams and Stitching
FA7-16	Laminating-Glass Fabric and Non-Metallic Sandwich, Low Pressure
FA7-17	Flattened Tube Ends
FA7-34	Laminating Temperature Resistance Polyester Resin
FA7-35	Foam-In-Place Plastic Core Parts Fabrication of
FA7-43	Laminating Epoxide Resin, Cold Curing, Non-Structural
FA7-44	Laminating Epoxide Resin, Heat Curing, Non-Structural

APPENDIX B (Continued)

Number	Nomenclature
FP5-10	Application of Moisture and Fungus Resistant Coating
FP5-19	Application of Weather Protective Coating to Rubber Parts
FP5-32	Preparation of Decalcomanias by the Silk Screen Process
FP5-33	Application of Conversion Type Finishes
FP5-34	Cleaning Chemical Film Treatment and Application of Organic Coating to Integral Tanks
HA0106-040	Fume Tight Sealing for Areas with Normal Operating Temperatures from 65 to 275 F
HA0109-003	Aluminum Metal Spraying
HA0109-006	Anodizing of Magnesium Alloys DOW #17
LA 0101-006	Installation of Bearings
LA0101-007	Bearings Sintered Oil Impregnated Storage Machining Processing Installation
LA0101-009	Installation of Metal V-Seals
LA0101-010	Receiving, Storage and Installation of Dry Film Lubrication Components
LA0102-001	Fabrication of Details for Resistance Welded Corrugated Metal Sandwich
LA0102-002	Cold Straightening of Steel Parts and Assemblies
LA0102-003	Elevated Temperature Forming of Titanium and Titanium Alloys Non-Deliverable Parts

APPENDIX B (Continued)

Number	Nomenclature
LA0102-004	Fabrication of Detail Parts for Use in Adhesive Bonded Honeycomb Sandwich
LA0102-005	Fabrication of Details for Brazed Sandwich Structure
LA0102-006	Titanium Alloy Forgings
LA0102-007	Elevated Temp Forming of Magnesium Alloys
LA0102-009	Limitations for Processing PH Steel Details
LA0102-010	Elevated Temperature Forming or Straightening High Strength Aluminum Alloys
LA0102-011	Cable Terminal Assemblies Fabrication Pre-Stretching and Proof Loading
LA0102-015	Elevated Temperature Forming of Steel Parts
LA0102-019	Testing of Hose Assemblies
LA0102-024	Straightening of Brazed and Heat Treated PH15-7MO Honeycomb Sandwich Structures
LA0102-027	Springs Compression, Close Tolerance, MFT and Inspection Requirements
LA0103-001	Machining of Close Tolerance Sheet and Plate
LA0103-006	Thermal Cutting
LA0103-010	Surface Roughness and Irregularities
LA0103-012	Drilling of Hardened Alloys
LA0104-002	Marking of Silicone Rubber Coated Glass Fabric Electrical Insulating Sleeving

APPENDIX B (Continued)

Number	Nomenclature
LA0104-003	Marking of Parts and Assemblies
LA0104-005	Use and Application of Fluid Line System Identification Markings
LA0104-012	Application of Decalcomanias
LA0105-003	Fabrication of Glass Fabric-Silicone Laminates for Structural Use
LA0105-012	Room Temperature Cementing and Laminating with Methyl Methacrylate Resin
LA0105-013	Post Forming of Laminates, Phenolic Sheet Plastic
LA0105-015	Masking of Transparent Plastic Materials
LA0106-006	Adhesive Bonding of Aluminum Alloy Assemblies for Usage at -67F to 180F
LA0106-007	Adhesive Bonding of Thermosetting Plastic and Misc. Materials for Usage from 67 to 180F
LA0106-008	Adhesive Bonding of Aluminum Alloy Assemblies for Usage at -67F to 260F
LA0106-009	Adhesive Bonding of Thermosetting Plastics and Misc. Materials for Usage from 67 to 260F
LA0106-021	Cementing Non-Structural General Purpose
LA0106-023	Liquid Tight Sealing of Areas with Normal Operating Temperatures from -65 to 225F
LA0107-034	Use of Room Temperature Vulcanizing Silicone Rubber Adhesive
LA0106-065	Installation Procedures for O-Ring Sealing of Bolted Assemblies

[redacted]

APPENDIX B (Continued)

Number	Nomenclature
LA0106-072	Use of Cold Curing Catalyzed Rubber Cement
LA0106-098	Adhesive Bonding with Electrical Conductive Adhesive
LA0107-001	ARC-Spot Welding
LA0107-021	Brazing of High Temperature Nickel Base Honeycomb Structure
LA0107-037	Percussion Stud Welding
LA0108-002	Application of Wash Primer
LA0108-030	Teflon-TFE-Dispersion Coating -725F Fusion
LA0109-001	Application of Scale Inhibiting Compound
LA0109-004	Application of NA3-1373 Coating to Titanium
LA0109-005	Nickel-Zinc Alloy Plating
LA0109-011	Application of A-418 Ceramic Coating
LA0109-017	Anodizing and Coloring of Aluminum Alloys
LA0109-021	Black Oxide Finishes for Steel
LA0111-001	Heat Treatment of Aluminum Alloys
LA0111-006	Heat Treatment of Carbon and Alloy Steels
LA0111-007	Heat Treatment of Titanium Alloy Sheet and Plate
LA0111-008	Heat Treatment of Titanium Alloy Bar Forgings and Extrusions

APPENDIX B (Continued)

Number	Nomenclature
LA0111-009	Processing of Steel Parts Heat Treated to High Tensile Strengths
LA0111-011	Heat Treatment of Copper and Copper Alloys
LA0111-012	Post-Forging Thermal Treatment for Ultra High Strength Steel
LA0111-013	Stress Relieving of Titanium Alloys
LA0111-014	Heat Treatment and Processing of Ultra High Strength Steel Alloys
LA0111-015	Heat Treatment of Nickel and Cobalt Base Alloys
LA0111-016	Prevention and Elimination of Hydrogen Embrittlement in Steel
LA0111-022	Heat Treatment of Heat and Corrosion Resistant, Precipitation Hardening Steels
LA0111-023	Heat Treatment of the 400 Series Corrosion Resistant Steels
LA0111-024	Heat Treatment of the Non-Hardenable, Austenitic, Corrosion Resistant Steels
LA0112-007	Application of High Temperature 650F Solid Dry Film Lubricant Coating
LA0115-005	Acceptance Standard for Brazed Honeycomb Sandwich Parts
LA0116-010	Preparation of NAA and Customer Industcial Equip. for Shipment and Storage
LA0118-001	Shot Peening of Metallic Parts

APPENDIX B (Continued)

Number	Nomenclature
MA0101-001	Installation of Inserts, Screw Thread, Brush Type
MA0101-002	Installation of Helically Coiled Wire, Screw Thread, Inserts
MA0101-004	Installation of Hose Clamps
MA0101-005	Installation of Threaded and Collard Fasteners
MA0101-006	Installations of Conventional Rivets and Blind Fasteners
MA0101-007	Installation of Quick-Action Fasteners
MA0102-001	Fabrication and Installation of Rigid and Flexible Tube Assemblies
MA0102-002	Standard Details for Metal Sheet and Extrusions
MA0102-003	Installation of Gamah Flexible Couplings
MA0103-001	Chem-Mill Processing of Steel and Heat Resistant Alloys
MA0103-002	Chemical Milling of Titanium and Titanium Alloys
MA0103-003	Chemical Milling of Aluminum Casting Alloys
MA0103-004	Chem-Mill Processing of Wrought Aluminum Alloys
MA0103-005	Tolerances on Machined Parts
MA0103-006	Chemical Milling and Processing of Welded Stainless Steel Tubing
MA0103-007	Electrical Discharge Machining

APPENDIX B (Continued)

Number	Nomenclature
MA0104-001	Leroy Lettering of Instrument & Control Panels
MA0104-002	Marking Methods Using Polyester Photographic Material
MA0104-003	Marking, Etch, Application of
MA0104-006	Fabrication of Metal Foil Nameplates
MA0104-008	Identification of Aerospace Ground Equipment Wiring for NASA Programs
MA0104-009	Markings, Stencilled, Application of
MA0104-010	Markings, Printed, Application of
MA0104-011	Markings, Impression Stamp Application
MA0104-012	Direct Marking of Production Items
MA0105-002	Elevated Temperature Resistant Glass Fabric Phenolic Laminates Fabrication of
MA0105-003	Elevated-Temp-RES Glass Fab-Phen Laminates for Non-Structural Applications
MA0105-004	Elevated Temp Resistant, Glass Fabric Reinforced, Phenolic Sandwich Construction, Fab or
MA0105-009	Polyurethane Type Foam, Semi-Rigid or Flexible, for Non-Structural Applications
MA0105-010	Laminates, Polyester Resin Preimpregnated Glass Fabric, High Strength, Fabrication of
MA0105-011	Fabrication of Plastic Insulation for WS-133A Guidance Body Section

APPENDIX B (Continued)

Number	Nomenclature
MA0105-026	Laminates Epoxy Resin Preimpregnated Glass Fabric High Strength Fabrication of
MA0105-031	Fabrication Terminal Boards from Glass-Reinforced Plastic Laminate
MA0105-033	Fabrication of Flexible Polyurethane Foam Inserts
MA0105-034	Sleeving Insulation, Extruded Flexible, Dilation and Installation of
MA0105-036	Fabrication and Installation of a Heat Transfer Medium for Use Between Electronics Modules and Cold Plates
MA0105-037	Foamed Resin Process for Structures Reinforcement and Electrical Thermal, and Shock Insulation
MA0105-038	Microballon Filled Explosive Absorber Fabrication of
MA0105-039	Phenolic Laminates, Elevated Temperature Resistant, High Silica Fabric, Structural Fabrication of
MA0106-001	Sealing of Pressurized Fuel Compartments for Short Term Service at Temp Up to 400F
MA0106-003	Bonding with Epoxy-Polymide Adhesive
MA0106-005	Adhesive Bonding of Steel and Aluminum Alloys for Low Temp Service
MA0106-008	Application of Metal Foil Nameplates
MA0106-010	Potting of Connector Assemblies Using Polyurethane
MA0106-015	General Purpose Sealing for Areas with Normal Operating Temp From -65 to 350F

APPENDIX B (Continued)

Number	Nomenclature
MA0106-017	Aerodynamic Smoothing with Flexible Joint Filter for Service Temps from -65 to 225F
MA0106-019	Bonding Instrumentation with High Temperature Epoxy Adhesive
MA0106-020	Bonding with Room Temperature Vulcanizing Silicone Rubber Compound
MA0106-022	Fabrication of Adhesive Bonded Assy for Use at Temp from -310 to 200F
MA0106-023	Bonding with Low Temperature Curing Adhesive for Service at -67 to 300F
MA0106-024	Fabrication of Fluid Passage Cooled, Adhesive Bonded Metal to Metal Assemblies
MA0106-025	Sealing Window Areas with Low-Temperature Resistant RTV Silicone Elastomer
MA0106-026	Bonding with Low Pressure, 250F Curing Adhesive for -67 to 200F Service
MA0106-027	Adhesive Bonding Cork Composition Sheet for Thermal Insulation
MA0106-029	Casting Welded Electronic Modules in a Filled Epoxy Resin
MA0106-031	Non-Structural Bonding with Low-Temperature-Resistant Silicone Rubber
MA0106-032	Bonding with Low Temperature Curing, Polyurethane Adhesive for Cryogenic Usage
MA0106-033	Bonding Metallic, Metal Composite and Non-Metallic Structures for Cryogenic and Heat-Resistant Applications

APPENDIX B (Continued)

Number	Nomenclature
MA0107-001	Fusion Welding
MA0107-002	Resistance Welding
MA0107-003	Silver Alloy Brazing
MA0107-004	Fusion Welding of Ground Support Equipment
MA0107-007	Brazing of Aluminum
MA0107-009	Tinning and Soldering of Electrical and Electronic Components
MA0107-010	Tinning and Soldering of Electrical and Electronic Components for Aerospace Projects
MA0107-011	Furnace Brazing of AM350 and AM355 Corrosion Resistant Steels
MA0107-012	Induction Brazing of 304L Cres Steel Tube Fitting to 304L Cres & Inconel
MA0107-013	Brazing, High Temperature, Above 1700F
MA0107-017	Fusion Welding of Tube Joints
MA0107-018	Soldering Aluminum, Titanium, and Steel for Sealing Aerospace Plumbing Systems
MA0107-019	Brazing Aluminum to Corrosion Resistant Steel
MA0107-020	Percussion Stud Welding
MA0107-023	Brazing and Heat Treating of PH Steel Honeycomb Sandwich Structures
MA0108-001	Procedure for Polyurethane Coding of Electronic Circuitry

APPENDIX B (Continued)

Number	Nomenclature
MA0108-005	Application of Organic Finishes-General
MA0108-006	Priming of Laminated and Moulded Plastic Surfaces
MA0108-008	Application of Acrylic Latex Enamel
MA0108-009	Application of Epoxy-Polyamid Primer Coating
MA0108-010	Application of Asphalt Base Roof Coating
MA0108-011	Application of High-Build Vinyl Coating
MA0108-013	Application of Air Drying and Baking Epoxy-Amine Enamel
MA0108-014	Application of Strippable Vinyl Coating
MA0108-015	Application of Freeze Coating to Welded Electronic Modules
MA0108-016	Application of Ozone and Weather Resistant Coating to Rubber Parts
MA0108-018	Application of Chemically Cured Zinc Dust-Filled Silicate Coating
MA0108-019	Application of Propellant and Flame Resistant Mastic Coating
MA0109-0003	Application of Chemical Film to Aluminum and Aluminum Alloys
MA0109-002	Phosphate Coatings for Ferrous Metals
MA0109-003	Application of Chemical Films to Aluminum and Aluminum Alloys

APPENDIX B (Continued)

Number	Nomenclature
MA0109-004	Electroless Nickel Plating
MA0109-005	Repair and Refinishing of Abraded Scratched Rework or Corroded Metal Surface
MA0109-006	Cadium Plating Cyanide Process
MA0109-007	Copper Plating
MA0109-008	Cadium Plating-Fluobdrate Process
MA0109-009	Chromic Acid and Sulphuric Acid Anodizing
MA0109-010	Hard Chrominum Plating
MA0109-011	Gold Plating
MA0109-012	Electroless Nickel Plating of Aluminum Tubing
MA0110-001	Cleaning Fluid Sys. Tube Assemblies and Fitting, Except Liquid Oxygen and Liquid Hydrogen
MA0110-010	General Cleaning Methods
MA0110-011	Cleaning of Aluminum and Aluminum Alloys
MA0110-012	Cleaning of Ferrous Alloys
MA0110-013	Cleaning and Passivation of Corrosion and Heat Resistant Alloys
MA0110-014	Cleaning and Protective Treatment of Magnesium Alloys
MA0110-015	Cleaning Titanium and Titanium Alloys
MA0110-017	Ultrasonic Cleaning

APPENDIX B (Continued)

Number	Nomenclature
MA0110-018	Cleaning Components of Oxygen Systems and Nitrogen Tetroxide Systems
MA0110-020	Abrasive Cleaning
MA0110-023	Stripping Organic Finishes
MA0110-024	Surface Preparation of Metals and Non-Metals for Adhesive Bonding
MA0110-026	Cleaning and Conditioning of Metals for Brazing and Soldering Processes
MA0110-027	Flourescent Penetrant Cleaning
MA0111-001	Heat Treatment of Ferrous and Non-Ferrous Alloys-General
MA0111-002	Heat Treatment of 17-7PH Corrosion Resistant Pressure Tanks
MA0111-003	Heat Treatment of 17-7PH Steel Sheet to 170,000 PSI Tensile Minimum
MA0111-004	Heat Treatment of MB0160-003 Bar, Extrusions Forgings and MB0160-001 Plate 17-4PH
MA0111-005	Heat Treatment of 18NI Marging Steel
MA0112-002	Application of Molybdenum Disulphide Coatings
MA0112-003	Application of Solid Dry Film Lubricant
MA0112-005	Application of Solid Dry Film Lubricant Coating with Top Coat Sealer
MA0113-001	Electrical Bonding AS-1 Missiles

APPENDIX B (Continued)

Number	Nomenclature
MA0113-002	Electrical Components and Hardware, Mounting of, General Spec for
MA0113-003	Taper-Pins, Installation and Test of
MA0113-004	Wiring Ground Support Equipment Identification and Installation of
MA0113-005	Shielded Wire Ground Support Equipment Assembly and Installation of
MA0113-006	Bonding Electrical Aerospace Ground Equipment
MA0113-008	Terminal Crimp Style Aerospace Ground Equipment Installation of
MA0113-009	Coaxial Connectors and Terminals, Electrical, Assembly of
MA0113-011	Installation of Aerospace Ground Equipment Wiring for NASA Programs
MA0113-012	Mechanical and Thermal Stripping of Insulated Hookup Wire
MA0113-013	Termination & Grounding of Shielded Wire in Aerospace Ground Equipment for NASA Projects
MA0113-015	Connectors, Electrical, Assembly and Installation of
MA0115-001	Ultrasonic Inspection
MA0115-005	Testing Compatibility of Material for Liquid Oxygen System
MA0115-006	Installation of Strain Sensors

APPENDIX B (Continued)

Number	Nomenclature
MA0115-007	Test for Prefit of Components for Brazed Honeycomb Panels
MA0115-008	Flammability Testing-Non-Metallic Materials for Manned Spacecraft
MA0115-009	Analysis of Gassing Products from Non-Metallic Materials in Manned Spacecraft
MA0115-010	Bondcheck Inspection of Brazed Honeycomb Panels
MA0115-011	Identification and Traceability Requirements for Suppliers of High Reliability Parts, General Specification for NASA Programs
MA0115-014	Scouring and Heat Stabilization of Dacron
MA0115-015	Testing of Aerospace Plumbing Systems Details
MA0116-012	Preparation for Delivery & Transport of Apollo Boilerplates
MA0116-013	In-Plant and Inter-Plant Parts Protection Requirements
MA0116-014	Supplier Packaging of Apollo S/M Main Fuel and Oxidizer Tanks
MA0116-015	Clean Packaging Requirements and Procedures
MA0116-016	Supplier Packaging and Handling of High Reliability Items
MA0116-017	Supplier Packaging Requirements
MA0116-021	Anti-Friction Bearing Supplier Packaging

APPENDIX B (Continued)

Number	Nomenclature
MA0116-027	Intra/Inter Plant Parts Protection Requirements for High Reliability Items
MA0606-001	Potting Electrical Wiring Tower Structure Apollo Launch Escape System Boiler plate 12
MA0606-002	Bonding of Wire Harness, Apollo Launch Escape Motor B/P No. 26
MA0606-003	Potting of Apollo Boilerplate Umbilical Connector
MA0606-004	Potting, Electrical Wiring, Apollo Launch Escape Tower Structure/ Boilerplate No. 13 and Subsequent
MA0606-005	Potting of Umbilical Disconnects Apollo BPL
MA0606-006	Adhesive Bonding, Apollo Command Module Honeycomb Structure
MA0606-008	Bonding of Wiring Harness, Apollo Launch Escape Motor B/P No. 12 and subsequent
MA0606-009	Potting of, C-Band Antenna Coupler
MA0607-001	Spot Brazing of Brazed Honeycomb Sandwich
MA0607-002	Fabrication of Apollo Aluminum Cold Plates by Eutectic Diffusion Bonding
MA0607-003	Fusion Welding of Tube Joints for the Saturn S-II Vehicle
MA0609-002	Corrosion Control of Apollo Components
MA0610-004	Cleanliness Requirements for Apollo Propulsion Systems Pressurizing System

APPENDIX B (Continued)

Number	Nomenclature
MA0610-012	Cleanliness Requirements for Apollo Spacecraft Cryogenic Storage System
MA0613-002	Electrical Bonding for Apollo Space System and GSE
MA0615-001	Leak Detection - Apollo Command Module Inner Skin Seam Welding Joints
MA0616-003	Intra/Inter Plant Parts Protection Requirements for the Apollo Program
MB0135-012	Insulation, Thermal, Fibrous, High Temp
NA0108-006	Coating Emissivity Black, Application of
NA2-4185	Phenolic Glass Fabric Molded Parts
NA2-4194	Polyester-Impregnated Glass Fiber Mat
NA2-7147	Sheet and Plate Weldable Titanium Alloy 5AI-2.5SN
NA3-01101	Deoxidizer, Chem-Mill
NA3-0152	Acid, Hydrofluoric Technical
NA3-0187	Nickel Sulfate Hexahydrate
NA3-3756	Tape, Masking, Chem-Mill
NA3-51001	Stripper, Chem-Mill, Titanium
NA3-51002	Maskant, Strippable, for Steel Chem-Mill
NA3-5188	Stripper, Chem-Mill
PR10-8	NAA Foundry Control on Lead and Lead Alloy Castings

APPENDIX B (Continued)

Number	Nomenclature
PR3-6	Hard Nickel Plating
PR5-13	Heat Treatment of Machining Invar
PR5-14	Straightening of Non-Corrosion Resistant Steel Parts and Assemblies
PR5-15	Heat Treatment of Gray Iron Castings
PR5-19	Stretch Aging of 17-7PH Steel
PR5-20	Heat Treatment of 17-7PH Steel Bars & Forgings
PR505-7	Stress Relieving of Titanium Alloys
PR507-3	Handling and Protection of Pressure Compartment Sealing Surface
PR7-11	Standards of Acceptance of Windshield Glass
PR8-10	Classification and Inspection Requirements for Aircraft Castings
PR9-10	Stress Relieving of Transparent Plastic Enclosures
RA0101-003	Inserts and Studs Screw Thread Keensert, Installation of
RA0105-001	Rigid Polyurethane Foam Application of
RA0106-003	Use of Room Temp Cured Contact Resin Adhesive for Non-Structural Parts
RA0106-006	Potting, Silicone Rubber, Room-Temp Cure, Electrical Systems
RA0109-010	Hand Anodizing Aluminum Alloys

Section II

Number	Nomenclature
MA0201-0063	Integrated System Checkout Procedure
MA0201-200	Electrical Systems Insulation, Resistance & Continuity Check, Procedure for
MA0201-0208	I&T Requirements - Internal Apollo
MA0201-0209	I&T Requirements, Subcontractor, Supplier
MA0203-0001	EBW Firing Unit, LES Handling Installation & Checkout of
MB0203-0002	Battery Storage, Silver Oxide Zinc Mar 4090, Handling, Activation, Charging & Checkout of
MA0203-0003	Battery, Storage, Silver Oxide Zinc, Mar 4094, Handling, Activation, Charging, and Checkout of
MA0203-0004	Battery Storage, Silver Oxide Zinc Mar 4095, Handling, Activation Charging & Checkout of
MA0203-0028	SA-7-BP: Apollo & Saturn Electrical Interface Checkout Requirements for
MA0203-0031	B/P 16 & 26, Relay Box, Electrical Power Checkout Procedure for
MA0205-0011	B/P 13, 15, 16, & 26: Sequencing Box, Electrical Control Functional Checkout & Calibration Procedure for
MA0205-0014	B/P 13, 15, 16 & 26: Tower Sequencer Assy. Control, Flight Worthiness Test, Procedure for
MA0205-0039	Modular Electrical Systems Continuity Check, Procedure for

[redacted]

[redacted]

Number	Nomenclature
MA0210-0005	Launch Escape System - Assembly and Checkout
MA0210-0015	LES, Thrust Vector Alignment of
MA0302-0003	Ordnance Equipment Handling, Storage & Inspection Procedure
MA0303-0002	Cable, Apollo Boilerplate Launch Escape Motor, Looming of
MA0303-0006	Color Coding of Electrical Connectors, Procedure for
MA0303-0007	Identification of Wires, Cables & Connectors for Apollo Project
MA0303-0015	Marking & Location of Electrical & Electrical Reference Designators on Apollo Spacecraft & Boilerplate Vehicles
MA0303-0017	Potting of Relay Assemblies using Polyurethane
MA0303-031	Electrical Wiring, Assembly & Installation of
MA0303-032	Electrical Connector Assemblies, Assembly of Electrical Systems Insulation, Resistance & Continuity Check, Procedure for
MA0303-033	Electrical Wires & Connectors, Stowage of
MA0303-034	Crimp Style Terminals Electrical Checkout
MA0303-035	Shielded Cable, Fabrication of
MA0304-0022	Procedure for Calibration of Vibration Measurement Sys. Control Part - ME106-0015, ME411-0255, &ME 473-0036

CONFIDENTIAL

Number	Nomenclature
MA0304-0023	Procedure for Calibration of Linear Accelerometer, Control P/N ME 449-0020
MA0306-0006	Installation Procedures for Integrated Cooling System
MA0308-0007	Alignment & Assembly Procedure
MA0308-0014	Ordnance Inst'l. LES Tower to Command Module Separation Sys.
MA0309-0014	Hardware Electrical & Mechanical Mounting of 0014
MA0310-0001	Insulation of Buna-N Rubber, LET Application of
MA0310-0002	Protective Coating, Ozone and Weather Resistant, LES & C/M Application of
MA0310-0004	Handling, Inspection & Storage of LES
MA0310-0005	Handling, Inspection & Storage of Tower Jettison Motor
MA0310-0006	Handling, Inspection & Storage of PCM
MA0310-0011	Handling, Inspection & Storage of the Tower Jettison Motor
MA0311-0004	Installation Procedure for Insulation
MA0401-0001	Detecto Temp Paint and Tempilaq Application
MA0405-0002	B/P 13, 15, 16 & 26: Sequencing Box, Electrical Control, Flight Worthiness, Test Procedure

CONFIDENTIAL

APPENDIX C

Material Specifications

1. Scope. - The following constitutes a list of approved Material Specifications for the Apollo Program. Those materials included in the construction of Boilerplate Number 26 shall be as set forth on the face of the boilerplate drawings.

Number	Nomenclature
AB0110-002	Collant, Corrosion Inhibiting
AB0115-002	Insulating Materials, Electrical Ceramic, Blocks and Shapes
AB0120-001	Sealant, Ceramic
AB0120-007	Resin, Liquid Polyamide, Thermosetting
AB0120-009	Polysurethane Compound Potting Flexible Non-Flammable
AB0120-013	Adhesive Bonding and Sealing Compound, Single Component, Silicone Rubber Base
AB0125-002	Magnesium Protective Treatment DOW-17
AB0125-004	Gold Plating
AB0125-010	Coating, Eopxy, Clear Air Drying
AB0130-007	Coating Polyurethane Resin, Flexible
AB0130-010	Eopxy Resins Epichorhydrinbisphenol, Liquid Type
AB0130-011	Epoxy Resin Epichlorohydrinbisphenol, Liquid Type, Glycidylether Modified
AB0130-013	Eopxy Compound, Filled, Semi-Flexible, Self-Extinguishing

APPENDIX C (Continued)

Number	Nomenclature
AB0130-014	Silicone Rubber Low Temperature Resistant Low Durometer /5-15/
AB0130-016	Potting Compound, Silicone Rubber, Room-Temperature-Vulcanizing
AB0130-021	Silicone Rubber, Room Temperature Curing/ Durometer 40-55/
AB0130-028	Rubber, Butyl Synthetic
AB0195-001	Cushioning Material, Urethane, Flexible
AB0225-001	Coating, Protective, Strippable
AB0290-002	Ink, Rubber Stamping/Non-Etching/
HB0170-004	Honeycomb Aluminum 5052-H39, Military Grade
LB0125-003	Chrominum Plate Hard, Thin for Explosive Operating Devices
LB0125-004	Silver Plating on Stainless Steel for Heat Reflection
LB0125-101	Satin Finish on all Alloy Parts for Aircraft Interior Trim
LB0125-103	Hard Anodic Coatings
LB0130-003	Rubber, Natural, Low Temp Resistant 40-50 Shore
LB0130-005	Resin-Prebodies Methyl Methracrylate
LB0130-006	Resin-Monomeric Methyl Methacrylate
LB0130-007	Resin-Low Pressure Laminating Self-Extinguishing

APPENDIX C (Continued)

Number	Nomenclature
LB0130-008	Fabric, Dacron Heat Set Structural Use
LB0130-009	Fabric Glass, Acrylic Resin Impregnated
LB0130-105	Glass Fabric, Pre-Impregnated, Silicone Resin
LB0130-107	Resin, Low Pressure Laminating, High Temp Polyester Base
LB0130-113	Resin, Polyester, Gel-Coat
LB0130-114	Laminated Parts Gel-Coated Glass-Fabric Polyester Resin
LB0135-100	Insulation, Thermal, Unbonded Glass Fiber Batt
LB0135-101	Thread, Glass
LB0140-001	Coating Solid Dry Film Lubricant
LB0140-002	Coating Solid Dry Film Lubricant, High Temperature 700F Maximum
LB0150-001	Braided Tubing Asbestos Teflon Impregnated
LB0160-100	Steel, Sheet and Plate, PH17-5MO, Cres
LB0160-113	Alloy and Cres Steel, and Heat Resistant Alloy Shapes Tolerances
LB0160-117	Welding Wire, Corrosion and Moderate Heat Resistant
LB0160-123	Steel Bar, Rod, & Shapes, 15-7MO, Corrosion Resistant, Precipitation Hardening
LB0160-124	Metals, Identification Marking

APPENDIX C (Continued)

Number	Nomenclature
LB0160-125	Close Tolerance Steel Sheet & Strip, PH15-7MO, Corrosion Resistant Precipitation Hardening
LB0160-126	Steel Tubing, PH15-7MO, Corrosion Resistant Precipitation Hardening
LB0160-129	Selected Strength PH15-7MO Steel Sheet and Plate
LB0160-130	Selector Strength, Close Tolerance PH15-7MO Steel Sheet & Strip
LB0160-142	Steel Tubing, PH15-7MO Corrosion Resistant, Precipitation Hardening, Welded
LB0160-146	Cold Reduced and Tempered Hydraulic Steel Tubing 350 Alloy Corrosion Resistant
LB0160-147	Steel, 350 Alloy, Corrosion Resistant Hydraulic Tubing
LB0160-148	Steel Foil, Corrosion Resistant, Precipitation Hardening
LB0160-149	PH15-7MO Corrosion Resistant Steel Foil, Condition 1/2C
LB0160-151	Steel Bar, AISI Type 440C, Consumable Electrode Vacuum Melted
LB0160-161	Steel, E-2 Alloy
LB0160-163	Densified Square Cells Honeycomb, PH15-7MO Cres Steel
LB0160-165	Steel, Sheet Strip and Plate, PH14-8MO, Corrosion Resistant, Precipitation Hardening
LB0160-167	Close Tolerance, PH14-8MO Steel Sheet, Strip and Plate Thru 1/4 Inch

APPENDIX C (Continued)

Number	Nomenclature
LB0169-003	Nickel Strike Plating Test
LB0170-103	Screen, Monel Metal
LB0170-105	Sterling-Lithium Braze Alloy
LB0170-110	Titanium Alloy GA1-4V Bar and Forgings
LB0170-113	Titanium Alloy Sheet, Strip and Plate GA1-4V
LB0170-122	Titanium Alloy /7A1-4MO/ Rod, Bar and Forgings
LB0170-124	Aluminum Alloy Sheet-Close Tolerance
LB0170-125	Aluminum Alloy, 7079-T6 & -T651, Sheet & Plate
LB0170-126	Welding Wire-Titanium and Titanium Alloys
LB0170-130	Welding Wire-Corrosion and Heat Resistant-Nickel Base Alloys
LB0170-138	Titanium Alloy/6A1-4V/ Closed Die Forgings
LB0170-139	Titanium Alloy 7Ai-4MO Closed Dye Forgings
LB0170-147	Titanium Alloy/6A1/4V/Bars, Rods & Shapes Extruded
LB0170-160	Brazing Alloy, Low Thermal Conductivity, 80/20 Nickel Matrix
LB0170-163	Magnesium Alloy Sheet, Close Tolerance
LB0170-167	Tubing, Corrosion & Heat Resistant, Nickel Base Alloy/Rene 41/
LB0170-169	Tubing, 2219 Aluminum Alloy

[redacted]

APPENDIX C (Continued)

Number	Nomenclature
LB0170-180	Sheet Lead 5-7% Antimony
LB0190-006	Tape Metal Foil, Fluid Line Identification
LB0210-100	Brazing Stop-Off Compound
LB0210-101	Bright Dip Copper and Copper Alloys
LB0210-109	Cleaner Electrolytic Alkaline
LB0225-100	Protective Coatings for Titanium Alloys During Heat Treatment
LB0255-102	Coating, Time and Temperature for Use on Cadmium Plating
MB0100-003	Substitution of Temper Condition, Form, and Size for Aluminum Alloys
MB0110-001	Oxygen, Liquid and Gas
MB0110-002	Nitrogen, Liquid and Gas
MB0110-003	Hydrogen, Liquid and Gas
MB012-015	Adhesive, Elevated Temp Resistant, 300 to 500 LT Weight for Honeycomb Sandwich Applications
MB0120-008	Adhesive, Room Temperature Curing, Structural
MB0120-019	Adhesive, Film & Primer, for -310 to 200F Usage
MB0120-011	Compound, Sealing, General Purpose
MB0120-013	Adhesive, Elevated Temp Resistant, 300 to 500F Lightweight

APPENDIX C (Continued)

Number	Nomenclature
MB0120-014	Adhesive, Elevated Temp Resistant 300 to 500 F, Foaming Type
MB0120-015	Adhesive, Elevated Temp Resistant, 300 to 500 LT Weight for Honeycomb Sandwich Applications
MB0120-016	Adhesive, Tape Structural, for -67 to 200F Service
MB0120-017	Adhesive, Nitrile Phenolic Film and Primer, for Metal to Metal Bonding 1-67 to 180F/
MB0120-018	Adhesive, for Bonding Vulcanized Neoprene to Itself and to Dacron Fabric
MB0120-020	Adhesive Structural, Cryogenic, for Bonding Metal and Non-Metals
MB0120-021	Polyurethane Compound, Potting and Coating, Flexible
MB0120-022	Adhesive Structural Cryogenic and Heat Resistant
MB0125-001	Synthetic Processing Lacquer, Silk Screen
MB0125-002	Coating, Polyurethane
MB0125-003	Electroless Nickel Plated
MB0125-005	Coating, Vinyl, High-Build
MB0125-010	Coating, Zinc Dust-Filled Silicate
MB0125-011	Protective Coating, Ozone and Weather Resistant
MB0125-012	Enamel, Epoxy-Amine, Air-Drying and Baking

APPENDIX C (Continued)

Number	Nomenclature
MB0125-014	Brush Plated Nickel and Tin on Titanium Alloy
MB0125-015	Freeze Coating Welded Electronic Module
MB0125-016	Enamel Gloss Rapid Air Drying
MB0125-017	Enamel, Alkyd, Semi-Gloss
MB0125-019	Coating, Urethane, Light Diffusing
MB0125-021	Coating, Zinc Dust Filled Silica Chemically Cured
MB0130-001	Silicone Rubber
MB0130-004	Glass Fabric Elevated Temp Resistant, Phenolic Resin Preimpregnated
MB0130-007	Glass Fabric, Polyester Resin Preimpregnated
MB0130-011	Molding Compound, Phenolic Resin & Glass Fiber Filled
MB0130-012	Glass Fabric, Epoxy Resin Impregnated, for Structural Applications at Temp Up to 300F
MB0130-013	Flexible Silicone Foam, Room Temp Curing
MB0130-014	Core, Honeycomb, Glass Fabric, Heat-Resistant -423 to 500F
MB0130-015	Low Density Rigid Foam for Thermal Insulation
MB0130-017	Dacron Cloth, Neoprene Coated
MB0130-019	Silicone Rubber, Low Temperature Resistant, Room Temperature Curing Durometer 55-65

CONFIDENTIAL

APPENDIX C (Continued)

Number	Nomenclature
MB0130-022	Rubber-Metallic Gasketing, Oriented Mesh, for RFI Shielding
MB0130-027	Elastomer, Fuel Resistant 7 1/2 Durometer
MB0130-028	Elastomers Space Environment Resistant 65-75 Durometer
MB0130-032	Casting Resin, Epoxy Type, Mineral Filled Self Extinguishing
MB0130-033	Insulation Ablative Filled Epoxy-Polyamide
MB0130-034	Silicone Rubber, Paste, Room Temperature Vulcanizing
MB0130-039	Foam, Polyurethane, Flexible, Low Density 3 lbs. cu. ft. Max.
MB0135-008	Glass Fabric, Scrimtype
MB0135-010	Insulation Thermal
MB0135-011	Insulation Thermal Molded
MB0135-012	Insulation Thermal Fibrous High Temperature
MB0135-013	Insulation Blanket, Thermal
MB0135-016	Film Aluminized Mylar, Crinkled
MB0150-005	Cable, Electrical, Shielded and Jacketed
MB0150-008	Wire and Cable, Electrical, Insulated, Copper, 600 Volts, =290 to /500

APPENDIX C (Continued)

Number	Nomenclature
MB0150-011	Wire and Cable, Electrical Apollo Spacecraft 600 Volts, to /250F
MB0150-012	Wire, Electrical, Hook-Up, Shielded and Jacketed, 600 Volts 105C. Maximum
MB0150-013	Wire, Electrical, Hook-Up, Shielded and Jacketed, 600 Volt -65 to 200C. Maximum
MB0150-014	Wire, Electrical, Interconnection, Shielded and Jacketed, 600 Volts, 105C. Maximum
MB0150-015	Cable Flat Braided Ribbon 600-Volt
MB0150-017	Wire, Thermocouple, Copper and Constantan, 22 Gauge Stranded Fep Teflon Insulated
MB0150-018	Wire, Thermocouple, Copper and Constantan, 26 Gauge Solid Fep Teflon Insulated
MB0150-019	Cable, Miniature, Multiple Conductor, 100 percent Shielded
MB0150-020	Cable, Electrical, Special Purpose
MB0150-023	Cable, Radio Frequency, Coaxial, Semi-Rigid
MB0150-024	Cable, Radio Frequency, Coaxial, Flexible
MB0160-001	Steel, 17-4PH Cres Plate 170,000 Tensile Min
MB0160-003	Steel, 17-4PH Corrosion Resistant Bars and Forgings, 170,000 Tensile Min
MB0160-006	Maraging Steel, Bar, Extrusions, and Forgings, Precipitation Hardening /18NI-9CO-5MO-0.5TI -0.10AI/
MB0160-007	Tubing, Steel Alloy, Corrosion Resistant, Type 304L

APPENDIX C (Continued)

Number	Nomenclature
MB0160-008	Welding Rod and Wire, Steel
MB0160-009	Bolts and Screws, Corrosion Resistant, A-286 Alloy
MB0160-011	Honeycomb, Welded, Precipitation Hardening, Corrosion Resistant Steel Alloys
MB0160-012	Low Carbon Steels-Bars, Rods, Sheet, Strip, Plate, Pipe Tubing, and Shapes
MB0160-013	Steel Castings, 17-4PH Alloy, Corrosion Resistant, Precipitation Hardening
MB0160-014	Wire, Spring Temper, 17-7PH Corrosion Resistant Precipitation Hardening
MB0160-015	Close Tolerance, PH14-8MO, Vacuum Induction Melted Steel Sheet, Strip, and Plate thru 1/2 Inch
MB0160-018	Steel, 17-4PH Corrosion Resistant Bar Extrusions, and Forgings for Optimum Impact Properties
MB0170-002	Aluminum Alloy, 2014 Bare Sheet and Plate
MB0170-003	Weldable Hand Forgings, 2014-T452 Aluminum Alloy
MB0170-008	Structural Tubing, 6Al-4V Titanium Alloy Welded
MB0170-010	Weldable Titanium Alloy, Bars & Forgings for Apollo Pressure Vessels
MB0170-011	Flash Welded Rings, Fabrication Form 2014 Aluminum Extrude Bar or Shapes

APPENDIX C (Continued)

Number	Nomenclature
MB0170-012	Inconel 718 Alloy, Bar, Forgings and Forging Stock, Consumable Electrode, Vacuum Melted
MB0170-013	Solder, Tin-Silver Alloy
MB0170-014	Gold-Copper-Nickel Braze Alloy 81.5AU-16.5AU -20.NI
MB0170-016	Aluminum Alloy, 7079-T652 Hand Forgings
MB0170-018	Structural Tubing, ¢Al-4V Titanium Alloy, Extruded, for Apollo Launch Escape Tower
MB0170-019	Gold-Nickel-Chrominum Braze Alloy, 72AU-22NI 6CR
MB0170-020	Titanium Alloy/6Al-4V/ Forgings for Apollo PressureVessel Components
MB0170-021	Aluminum Alloy, 2014 Bare As-Rolled Plate
MB0170-026	Inconel 718 Alloy Forgings, for Pressure Vessels, Consumable Electrode, Vacuum Melted
MB0190-001	Nameplates, Metal Foil
MB0210-001	Chem-Mill Processing, Solutions for
MB0210-002	Mixed Acid, Aluminum Deoxidized & Etchant
MB0210-003	Trichloroethylene Reclaimable Liquid Oxygen Compatible
MB0210-004	Cleaner, Alkaline, Non-Corrosive, Low-Foaming
MB0210-006	Fluorescent Penetrant Inspection Materials, Oxidizing Agent Compatible

APPENDIX C (Continued)

Number	Nomenclature
MB0210-007	Water, High Purity
MB0210-008	Cleaner, Alkaline for Aluminum Alloys
MB0225-001	Coating, Vinyl, Strippage
MB0225-002	Maskant, Chem-Mill, Hand Strippable
MB0290-002	Precision Clean Certification Decal Pressure Sensitive, Temper Proof
MB0295-004	Fiberboard, Laminated, Corrugated Multi-Purpose
MB0295-005	Material Cleanliness Level Precision Clean Packaging
MB0295-006	Film Transparent, Precision Clean Packaging
MB0295-007	Closures, Special Plastic, Precision Clean Packaging
MB0295-008	Tape, Non-Residual, Precision Clean Packaging
MB0295-009	Teflon, Glass Filled, Precision Clean Packaging
MB0295-010	Parts Protection Materials and Devices Catalog
NB0110-003	Helium Gas
RB0130-005	Plastic Polychlorotrifluoroethylene Sheet Formed and Molded Parts
RB0130-007	Plastic, Fluorinated Ethylene Propylene Sheet, Formed and Molded Parts
RB0140-002	Tetrafluroethylene Thread Sealant and Anti-Seize Tape

APPENDIX C (Continued)

Number	Nomenclature
RB0140-004	Tape, Teflon Press Sens, Fuel-Resist Adhesive
RB0160-006	Corrosion Resistant Tubing, 29NI, 20CR,2MO, 3CU, CO-TA Stabilized
RB0160-011	Steel Plate and Sheet, Corrosion and Heat Resistant 29NI, 20CB, 20CR, CB-TA Stabilized
RB0170-005	Aluminum Alloy, Welding Rod and Wire
RB0170-015	6066 Aluminum Alloy Forgings
RB0170-039	Alloy Sheet, Strip, and Plate Cre Nickel Base 18CR, 18FE, 5CB, 3MO, .8TI, .6A1TE

APPENDIX D

Procurement Specifications

1. Scope. - The following list constitutes a list of Procurement Specifications for Boilerplate Number 26.

Number	Nomenclature
ME128-0002-0408	Rivet-Blind, Threaded, Hex
ME 362-0006-0006	Core, Radiator
ME 414-0004-0111	Connector Assembly, Electrical
ME 414-0010-0201	Connector Assembly, Electrical
ME 414-0010-0211	Connector Assembly, Electrical
ME 414-0084-0001	Connector, Receptacle, Electrical, Umbilical
ME 414-0084-0002	Connector, Receptacle, Electrical, Umbilical
ME 414-0084-0003	Connector, Receptacle, Electrical, Umbilical
ME 414-0260-2010	Connector, Electrical, Subminature - Male
ME 414-0260-4010	Connector, Electrical, Subminature - Male
ME 414-0260-5010	Connector, Electrical, Subminature - Male
ME 414-0261-2001	Connector, Electrical, Subminature - Female
ME 414-0261-4001	Connector, Electrical, Subminature - Female
ME 414-0261-5001	Connector, Electrical, Subminature - Female
ME 416-0001-0004	Terminal
ME 416-0001-0013	Terminal

[redacted]

APPENDIX D (Continued)

Number	Nomenclature
ME 443-0019-0053	Resistor, Fixed, Wirewound Precision, .50W, ± 1% Tol.
ME 452-0045-0002	Switch, Motor Driven
ME 452-0045-0003	Switch, Motor Driven
ME 453-0018-0011	Cutting Charge Assembly, Explosive Bolt
ME 453-0019-0011	Cartridge Assembly - Explosive Bolt, Dual Mode
ME 453-0020-0011	Retainer Cartridge - Explosive Bolt, Dual Mode
ME 461-0007-0002	Battery Spacecraft, Pyrotechnic, Silver Oxide Zinc
ME 467-0004-0006	Rocket Motor - Tower Jettison - Launch Escape System
ME 467-0004-0011	Rocket Motor - Tower Jettison - Launch Escape System
ME 467-0005-0006	Motor, Launch Escape, Pitch Control

[redacted]

APPENDIX E

Flight Instrumentation

1. Scope. - The Flight Instrumentation for Boilerplate Number 26 will be determined and furnished by the MFSC.

DISTRIBUTION FOR CFE SPECIFICATION* (PARAGRAPH 4.2)

Address	Copies
National Aeronautics and Space Administration Atlantic Missile Range Operations Port Canaveral, Florida Attn: Mr. B.P. Brown	5
NASA Headquarters 1520 H Street Washington, D. C. Attn: Mr. G.M. Low, MD(P)	6
Grumman Aircraft Engineering Corporation Bethpage, Long Island, New York Attn: P. Gardiner	1
MIT Instrumentation Laboratory 75 Cambridge Parkway Cambridge 39, Massachusetts	1
NASA Resident Apollo Spacecraft Project Officer Grumman Aircraft Engineering Corporation Bethpage, Long Island, New York Attn: Mr. Jack Small	1
National Aeronautics and Space Administration Post Office Drawer D White Sands Missile Range White Sands, New Mexico	2
National Aeronautics and Space Administration Manned Spacecraft Center Transportation Officer Elington Building 381 Houston, Texas Attn: Apollo Document Control Center Elington 336 - TO BE OPENED BY ADDRESSEE ONLY	35

*The distribution for this report has been accomplished in compliance with paragraph 1.2 of Exhibit I contract NAS9-150 and the Apollo Documentation Distribution List (NASA-MSC letter SP-63-478, dated 2 October 1963) and revised in accordance with NASA letter SPI-63-634, dated 30 December 1963.

Address	Copies
National Aeronautics and Space Administration Headquarters NASA Plant Officer P.O. Box 2500 Daytona Beach, Florida Attn: Administrative Contracting Officer	2
National Aeronautics and Space Administration Manned Spacecraft Center Resident Apollo Spacecraft Project Office NAA 12214 Lakewood Boulevard Downey, California	1
National Aeronautics and Space Administration Ames Research Center Moffett Field, California Attn: Library	2
National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio Attn: Library	2
National Aeronautics and Space Administration Flight Research Center Edwards AFB, California Attn: Research Library	1
National Aeronautics and Space Administration Jet Propulsion Laboratory Pasadena, California Attn: Library	2
National Aeronautics and Space Administration Langley Research Center Langley AFB, Virginia Attn: Mr. A.T. Mattson	2
National Aeronautics and Space Administration Goddard Space Flight Center Greenbelt, Maryland Attn: Manned Flight Support Office, Code 512	2
National Aeronautics and Space Administration George C. Marshall Space Flight Center Huntsville, Alabama Attn: R-SA	2
John F. Kennedy Space Center, NASA Cocoa Beach, Florida Attn: LO-PE	2